

MSC Guidelines for Review of Steering Gear Piping Systems

Procedure Number: E1-26

Revision Date: 01/05/00

References

- a. Title 46 CFR 58.25 (Subchapter D, H, I and K vessels)
 - b. Title 46 CFR 130.130 (Subchapter L vessels < 100 gross tons)
 - c. Title 46 CFR 130.140 (Subchapter L vessels ≥ 100 gross)
 - d. Title 46 CFR 182.600 (Subchapter T vessels)
 - e. SOLAS, Consolidated Edition, 1997, Chapter II-1, Regulation 29
 - f. ABS Rules for Building and Classing Steel Vessels under 90 Meters (295 feet) in Length
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MSC Guidelines for Review of Steering Gear Piping Systems (cont'd)

General Review Guidance

Vessels subject to Title 46 CFR Subchapter F

- ❑ Materials shall conform to the specifications/standards listed in 56.60. Alternatively, the materials may be selected from the specifications listed in sections I, III and VIII of the ASME code. (Title 46 CFR 58.30-15(b))
- ❑ Maximum allowable working pressure and minimum wall thickness should be calculated using 80% allowable stress as outlined in 56.07-10.
- ❑ Materials used for the transmission of power to the rudders stocks (hydraulic cylinders) shall be constructed of materials having an elongation of not less than 12% in 2 inches. (Title 46 CFR 58.25-75(a) and Policy files)
- ❑ Hydraulic cylinders shall have a burst pressure ≥ 4 times MAWP. A certified burst test report is acceptable. (Title 46 CFR 58.30-30(c))
- ❑ Flexible non-metallic hoses shall conform to the SAE J-1942 specification. Hose lengths > 30 inches are acceptable where required for proper operation or flexibility. (Title 46 CFR 58.30-20)
- ❑ Two separate, independent systems (main and auxiliary) shall be provided except that an auxiliary steering system is not required if:
(Title 46 CFR 58.25-10(e))
 - ❑ In a passenger vessel, the main steering gear has duplicate power units **and** the main steering gear is capable of meeting the performance requirements listed in 56.25-10(b)(2) with any **one** of the power units not operating.
 - ❑ In a cargo vessel, the main steering gear has duplicate power units **and** the main steering gear is capable of meeting the performance requirements listed in 56.25-10(b)(2) with **all** of the power units operating.
- ❑ The systems are arranged such that with a single point failure in the piping system or one of the power units, steering can be regained in less than ten minutes. See regulations for exemptions.
- ❑ Auxiliary steering is not required on a double ended ferryboat with independent steering at each end of the vessel. (Title 46 CFR 58.25-10(d))

MSC Guidelines for Review of Steering Gear Piping Systems (cont'd)

Vessels subject to Title 46 CFR Subchapter F (cont'd)

- ❑ Split flange and flareless fittings are prohibited. (Title 46 CFR 58.25-20(d))
- ❑ In vessels > 70,000 gross tons and tank vessels > 10,000 gross tons, the main steering gear must have two or more identical power units. (Title 46 CFR 58.25-10(f) and 58.25-85(b))
- ❑ Vessels on ocean, coastwise, Great Lakes routes shall have a hydraulic storage tank with sufficient capacity to recharge at least power actuating systems, including the reservoir. (Title 46 CFR 58.25-20(c)(2))
- ❑ Arrangements for steadying the rudder during an emergency or for shifting of steering gear shall be provided. A suitable valve arrangement, including a cylinder bypass, is acceptable. (Title 46 CFR 58.25-5(h))
- ❑ Verify that the hydraulic system components are rated for at least 1.5 MAWP. Manufacturer's documentation/certification is acceptable as meeting this requirement. (Title 46 CFR 58.30-35(c))
- ❑ A filtering device is required. (Title 46 CFR 58.25-20(c)(1))
- ❑ The hydraulic storage tank, if required, shall be permanently attached to the reservoir and must be fitted with a sounding tube or level indicator. (Title 46 CFR 58.25-20(c)(2))
- ❑ Electric or mechanical rudder stops are to be provided. (Title 46 CFR 58.25-50)
- ❑ Materials with low melting points (aluminum and nonmetallic seals) are prohibited in control or actuating systems unless installed in areas of low fire risk, or due to redundancy in system, steering may be immediately restored after component failure. (Title 46 CFR 58.25-75(b))
- ❑ Fluid power motors and pumps shall be certified by the manufacturer as suitable for use. (Title 46 CFR 58.30-15(f))

MSC Guidelines for Review of Steering Gear Piping Systems (cont'd)

Vessels subject to Title 46 CFR Subchapter F (cont'd)

- ❑ Non-pressurized components (rudder post, rudder, etc) shall be designed to standards equivalent to reference (f), rule 4/8.3
 - ❑ **Additional requirements for tank vessels > 10,000 gross tons are listed in Title 46 CFR 58.25-85.**
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MSC Guidelines for Review of Steering Gear Piping Systems (cont'd)

General Review Guidance

Vessels subject to Title 46 CFR Subchapter L **(Hydraulic Helm Installations)**

- ❑ The vessel must have multiple screw propulsion capable of pilothouse control. Control of steering gear system must be provided on the bridge. (Title 46 CFR 130.140(b)(8))
- ❑ The maximum allowable working pressure shall not exceed 1800 psi. (Title 46 CFR 130.140(b)(2))
- ❑ Piping materials shall conform to the specifications listed in 56.60; alternatively, the materials may be selected from the specifications listed in sections I, III and VIII of the ASME code. (Title 46 CFR 130.140(b)(3))
- ❑ Piping wall thickness shall not be less than schedule 80. (Title 46 CFR 130.140(b)(3))
- ❑ Piping runs shall be located as far inboard as possible. Redundancy in piping is not required. (Title 46 CFR 130.140(b)(3))
- ❑ Two steering pumps capable of meeting the performance requirements of 130.130(c) **or** a single pump with a cascading overflow reservoir are/is required.
- ❑ If a split, cascading reservoir is used, each side must have the capacity to operate the system. (Title 46 CFR 130.140(b)(6))
- ❑ Dual hydraulic cylinders, capable of being isolated and operating separately, are required. (Title 46 CFR 130.140(b)(9))
- ❑ Rudder stops are required. (Title 46 CFR 130.140(b)(5))
- ❑ A means to manually center and steady the rudder is required. (Title 46 CFR 130.140(b)(15))

MSC Guidelines for Review of Steering Gear Systems (cont'd)

General Review Guidance

Vessels subject to Title 46 CFR Subchapter T

- ❑ Piping shall be constructed of ferrous materials. For pressures greater than 150 psi, MAWP and minimum wall thickness shall be calculated IAW ANSI B31.1. (Title 46 CFR 182.710)
- ❑ Flexible non-metallic hose shall conform to the SAE J1942 specification. (Title 46 CFR 182.720)
- ❑ An auxiliary means of steering shall be provided except for vessels meeting one of the following: (Title 46 CFR 182.620(c))
 - ❑ Steering gear is provided in duplicate
 - ❑ Multiple screw propulsion with pilothouse control
 - ❑ No regular rudder is fitted
 - ❑ A rudder and tiller are the main steering gear
- ❑ Control of the steering gear shall be provided at the operating station. (Title 46 CFR 182.610(a)(3))
- ❑ Structural or internal rudder stops are required. (Title 46 CFR 182.610(e))
- ❑ Limit switches for stopping the steering gear before it reaches the stops are required. (Title 46 CFR 182.610(f)(5))
- ❑ A means for manually centering the steering gear shall be provided. (Title 46 CFR 182.610(f)(4))
- ❑ Vessels > 65 feet in length must have a visual indication of steering gear power unit operation located at the operating station. (Title 46 CFR 182.610(g)(1))

Attachments

- ❑ None